May 11, 2006

Mr. William Levis
Senior Vice President and Chief Nuclear Officer
PSEG LLC - N09
P. O. Box 236
Hancocks Bridge, NJ 08038

SUBJECT: HOPE CREEK GENERATING STATION - NRC INTEGRATED INSPECTION REPORT 05000354/2006002

Dear Mr. Levis:

On March 31, 2006, the US Nuclear Regulatory Commission (NRC) completed an inspection at your Hope Creek Nuclear Generating Station. The enclosed integrated inspection report documents the inspection findings, which were discussed on April 3, 2006, with Mr. George Barnes and other members of your staff.

The inspection examined activities conducted under your license as they relate to safety and compliance with the Commission's rules and regulations and with the conditions of your license. The inspectors reviewed selected procedures and records, observed activities, and interviewed personnel.

The report documents two NRC-identified findings and one self-revealing finding of very low safety significance (Green). These three findings were determined to involve violations of NRC requirements. Additionally, three licensee-identified violations which were determined to be of very low safety significance are listed in the report. However, because of the very low safety significance and because they are entered into your corrective action program, the NRC is treating these findings as non-cited violations (NCVs) consistent with Section VI.A.1 of the NRC Enforcement Policy. If you contest any NCV in this report, you should provide a response within 30 days of the date of this inspection report, with the basis for your denial, to the Nuclear Regulatory Commission, ATTN: Document Control Desk, Washington, DC 20555-0001; with copies to the Regional Administrator, Region I; the Director, Office of Enforcement, United States Nuclear Regulatory Commission, Washington, DC 20555-0001; and the NRC Resident Inspector at the Hope Creek Generating Station.

In accordance with 10 CFR 2.390 of the NRC's "Rules of Practice," a copy of this letter, its enclosure, and your response (if any) will be available electronically for public inspection in the NRC Public Document Room or from the Publicly Available Records (PARS) component of NRC's document system (ADAMS). ADAMS is accessible from the NRC Web site at http://www.nrc.gov/reading-rm/adams.html (the Public Electronic Reading Room).

Sincerely,

/RA/

Mel Gray, Chief
Projects Branch 3
Division of Reactor Projects

Docket No: 50-354
License No: NPF-57

Enclosure: Inspection Report 05000354/2006002
w/Attachment: Supplemental Information

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U.S. NUCLEAR REGULATORY COMMISSION

REGION I

Docket No:	050000354
License No:	NPF-57
Report No:	05000354/2006002
Licensee:	Public Service Enterprise Group Nuclear LLC
Facility:	Hope Creek Generating Station
Location:	P.O. Box 236 Hancocks Bridge, NJ 08038
Dates:	January 1, 2006 through March 31, 2006
Inspectors:	G. Malone, Senior Resident Inspector T. Wingfield, Resident Inspector J. Schoppy, Senior Reactor Inspector J. Wiebe, Project Engineer D. Johnson, Reactor Inspector J. Josey, Reactor Inspector M. Snell, Reactor Inspector
Approved By:	Mel Gray, Chief Projects Branch 3 Division of Reactor Projects

Enclosure

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SUMMARY OF FINDINGS

IR 05000354/2006002; 01/01/2006 - 03/31/2006; Hope Creek Generating Station; Heat Sink Performance, Maintenance Effectiveness, Other Activities.

The report covered a 13-week period of inspection by resident inspectors and announced inspections by regional reactor inspectors. Three Green non-cited violations (NCVs) were identified. The significance of most findings is indicated by their color (Green, White, Yellow, or Red) using Inspection Manual Chapter (IMC) 0609, "Significance Determination Process" (SDP). Findings for which the SDP does not apply may be Green or be assigned a severity level after NRC management review. The NRC's program for overseeing the safe operation of commercial nuclear power reactors is described in NUREG-1649, "Reactor Oversight Process," Revision 3, dated July 2000.

A. NRC-Identified and Self-Revealing Findings

Cornerstone: Mitigating Systems

- Green. The inspectors identified a non-cited violation of 10 CFR Part 50, Appendix B, Criterion XVI, "Corrective Action," for PSEG's failure to implement corrective actions for a condition adverse to quality involving inadequate procedure guidance for service water pump packing replacement. This resulted in a degraded condition on the 'B' service water pump packing assembly that was identified by the inspectors on February 13, 2006. PSEG's corrective actions included tightening the packing and revising maintenance procedures.

  The finding was more than minor because it was associated with the equipment performance attribute of the Mitigating Systems cornerstone and affected the cornerstone objective of ensuring the availability, reliability, and capability of systems that respond to initiating events. In accordance with NRC Inspection Manual Chapter 0609, Appendix A, "Significance Determination of Reactor Inspection Findings for At-Power Situations," the inspectors conducted a Phase 1 SDP screening and determined the finding to be of very low safety significance (Green) because the finding was not a design or qualification deficiency, did not represent a loss of system safety function, and did not screen as risk significant due to external events. The finding had a cross-cutting aspect in the area of problem identification and resolution because PSEG did not identify that corrective actions were not implemented correctly during a corrective action effectiveness review. (Section 1R07)

- Green. The inspectors identified a non-cited violation of 10 CFR 50, Appendix B, Criterion XVI, "Corrective Action," when the 'D' service water strainer was rendered unavailable for 49 hours on November 6, 2005. On May 23, 2005, PSEG technicians reassembled the 'D' service water strainer with the backwash arm off-center and a packing gland machined from its original size to allow assembly. The resulting non-conforming condition was not entered into PSEG's

corrective action program. The absence of this documentation and evaluation led to the reuse of the machined gland, which resulted in a packing leak and the unavailability of the 'D' service water strainer in November 2005. PSEG initiated actions to address the problem associated with not entering the non-conforming condition into the corrective action program.

This performance deficiency was more than minor because it was associated with the equipment performance attribute of the Mitigating Systems and Initiating Events cornerstone objectives and affected both cornerstone objectives. In accordance with NRC Inspection Manual Chapter 0609, Appendix A, "Significance Determination of Reactor Inspection Findings for At-Power Situations," the inspectors conducted a Phase 1 SDP screening and determined a more detailed Phase 2 evaluation was required to assess the safety significance, because the finding affected two cornerstones. The inspectors determined that the finding was of very low safety significance (Green). The performance deficiency had a cross-cutting aspect in the area of problem identification and resolution because PSEG did not identify a condition adverse to quality by entering the issue into the corrective action program. (Section 1R12)

- Green. A self-revealing, non-cited violation of 10 CFR 50 Appendix B, Criterion XVI, “Corrective Action," was identified when the guide vane pivot arm on the 'A' control room chiller was discovered to be operating incorrectly in May 2005, rendering the chiller unable to perform its design function. PSEG corrective actions included modifying applicable procedures and providing training to maintenance technicians.

  This finding was more than minor because it was associated with the equipment performance attribute of the Mitigating Systems cornerstone and affected the cornerstone objective to ensure the availability, reliability, and capability of systems that respond to initiating events. The improper use of setscrews on the 'A' control room chiller guide vane arms resulted in the chiller not being able to perform its design function and unplanned unavailability of the chiller for about 85 hours to implement repairs. The inspectors completed a Phase 1 screening using Appendix A of Inspection Manual Chapter (IMC) 0609, “Determining the Significance of Reactor Inspection Findings for At-Power Situations,” and determined that the performance deficiency was of very low safety significance (Green) because the finding was not a design or qualification deficiency, did not represent a loss of system safety function, did not represent an actual loss of safety function of a single train greater than its technical specification allowed outage time, and did not screen as risk significant due to external events. (Section 4OA3)

B. Licensee Identified Violations

Violations of very low safety significance, which were identified by PSEG have been reviewed by the inspectors. Corrective actions taken or planned by PSEG have been entered into PSEG's corrective action program. These violations and corrective actions are listed in Section 4OA7 of this report.

REPORT DETAILS

Summary of Plant Status

Hope Creek began the quarter operating at 100 percent (%) power. On January 14, 2006, an electrical transient in non-vital 13kV bus-work caused a loss of the in-service offgas recombiner train. Hope Creek reduced power to approximately 80% in accordance with plant procedures because main condenser vacuum was degrading due to the loss of the offgas recombiner train. Operators reduced power to 71% in accordance with procedures to clear increased vibration readings on the 'A' and 'B' reactor recirculation pumps. Power was further reduced to 60% to perform scheduled control rod scram time testing. The plant was returned to 100% power on January 15, 2006.

On February 4, 2006, control room operators de-energized the 10B110 125V bus due to a report of smoke from a breaker powered from the bus. This caused a recirculation pump runback because the 'A' primary condensate pump tripped when 10B110 was deenergized. Plant power was stabilized at 54% following the runback. The plant was returned to 100% power on February 5, 2006, and remained at 100% power for the remainder of the inspection period.

1. REACTOR SAFETY

Cornerstones: Initiating Events, Mitigating Systems, and Barrier Integrity

1R01 Adverse Weather Protection (71111.01)

a. Inspection Scope (1 sample)

The inspectors reviewed adverse weather preparation activities related to the potential for river grass intrusion conditions. Inspectors assessed implementation of PSEG's grassing readiness plan through plant walkdowns, corrective action program review, and discussions with cognizant managers and engineers. Documents reviewed by inspectors are listed in the attachment.

b. Findings

No findings of significance were identified.

1R04 Equipment Alignment (71111.04)

.1 Partial Walkdown (4 samples)

a. Inspection Scope

The inspectors performed a partial walkdown of the following four systems to verify the operability of redundant or diverse trains and components when safety equipment was inoperable. The inspectors attempted to identify any discrepancies that could impact

the function of the system, and therefore, potentially increase risk. The inspectors reviewed applicable operating procedures, walked down control systems components, and verified that selected breakers, valves, and support equipment were in the correct position to support system operation. The inspectors also verified that PSEG had properly identified and resolved equipment alignment problems that could cause initiating events or impact the capability of mitigating systems or barriers and entered them into the corrective action program. Documents reviewed are listed in the attachment.

- 'A' emergency diesel generator (EDG) and 10A401 switchgear equipment during maintenance on the 'B' EDG on January 30, 2006;
- 'B' residual heat removal (RHR) pump and heat exchanger during maintenance on the 'A' RHR pump on March 1, 2006;
- 'A' & 'C' core spray loops during maintenance on 'B' & 'D' core spray trains on February 15, 2006; and
- Safety auxiliaries cooling system throttled valves on February 28, 2006.

.2 Complete Walkdown (1 sample)

a. Inspection Scope

The inspectors conducted one complete walkdown of accessible portions of the standby liquid control (SLC) system on February 9 and 10, 2006. The inspectors used PSEG procedures and other documents listed below to verify proper system alignment and functional capability:

- Procedure HC.OP-SO.BH-0001, Standby Liquid Control System Operation;
- HC.OP-IS.BH-0001, Standby Liquid Control Pump - AP208 - Inservice Test;
- HC.OP-IS.BH-0002, Standby Liquid Control Pump - BP208 - Inservice Test;
- HC.OP-IS.BH-0101, Standby Liquid Control System Valves - Inservice Test;
- HC.OP-ST.BH-0001, SLC Valve Operability Test - Monthly;
- HC.CH-SA.BH-0001, Sampling The Standby Liquid Control System; and
- Drawing No. M-48-1, Standby Liquid Control.

The inspectors also verified SLC electrical power requirements, labeling, operator workarounds, hangers and support installation, and associated support systems status. The walkdowns also included evaluation of system piping and equipment against the following considerations:

- Oil reservoir levels appeared normal;
- Snubbers did not appear to be leaking hydraulic fluid;
- Hangers were functional;
- Long-term scaffold construction and placement; and
- Valves aligned correctly to support injection.

In addition, the inspectors reviewed outstanding maintenance work orders to verify that the deficiencies did not significantly affect the SLC system function and were being identified and appropriately resolved.

b. Findings

No findings of significance were identified.

1R05 Fire Protection (71111.05)

a. Inspection Scope (10 samples)

The inspectors conducted a tour of the ten areas listed below to assess the material condition and operational status of fire protection features. The inspectors verified that combustibles and ignition sources were controlled in accordance with PSEG's administrative procedures; fire detection and suppression equipment was available for use; passive fire barriers were maintained in good material condition; and compensatory measures for out-of-service, degraded, or inoperable fire protection equipment were implemented in accordance with PSEG's fire plan. Documents reviewed are listed in the attachment.

- 'A,' 'B,' 'C,' and 'D' fuel oil storage tank (FOST) rooms on January 3-4, 2006;
- 'A' residual heat removal heat (RHR) exchanger and pump rooms on January 5, 2006;
- 'B' RHR exchanger and pump rooms on January 5, 2006;
- 'A', 'B', 'C', and 'D' core spray pump rooms on January 18, 2006;
- High pressure coolant injection pump and turbine room on January 18, 2006;
- Reactor core isolation cooling pump and turbine room on January 18, 2006;
- Lower Control Equipment Room on January 31, 2006;
- Electrical access area elevation on January 31, 2006;
- Class 1E switchgear rooms on January 31, 2006; and
- Control equipment, HVAC, Inverter & battery rooms on January 31, 2006.

b. Findings

No findings of significance were identified.

1R06 Flood Protection Measures (71111.06)

.1 Internal Flooding

a. Inspection Scope (1 sample)

The inspectors reviewed selected risk-important plant design features and PSEG procedures intended to protect the plant and its safety-related equipment from internal flooding events. The inspectors focused on mitigation strategies and equipment in the emergency diesel generator fuel oil storage tank (FOST) rooms. The inspectors

reviewed flood analysis and design documents, including the updated final safety analysis report (UFSAR), engineering calculations, and abnormal operating procedures. The inspectors observed the condition of wall penetrations, flood alarm switches, and drains to assess their readiness to contain flow from an internal flood in accordance with the design basis. In addition, the inspectors reviewed PSEG drawings and performed walkdowns of the FOST rooms on January 3-5, 2006, to assess potential flooding vulnerabilities.

b. Findings

No findings of significance were identified.

1R07 Heat Sink Performance (71111.07B)

a. Inspection Scope (3 samples)

Based on a plant specific risk assessment and previous inspections, the inspectors selected three heat exchanger (HX) samples for this review: the A1 safety auxiliaries cooling system (SACS) HX, the 'A' residual heat removal (RHR) HX, and the 'B' RHR HX. SACS provides cooling to the RHR HXs and transfers its heat load to the service water (SW) system via the SACS HXs. The SW system supplies cooling water from the Delaware River (the ultimate heat sink).

The inspectors reviewed PSEG's methods (inspection, cleaning, maintenance, and performance monitoring) used to ensure heat removal capabilities for the SACS HXs and compared them to PSEG's commitments made in response to Generic Letter 89-13, "Service Water System Problems Affecting Safety-Related Equipment." The inspectors verified that periodic SW side pressure drop readings for the SACS HXs had been recorded in order to monitor for potential macro-fouling conditions. The inspectors reviewed the eddy current test methodology and results to verify that the number of plugged SACS HX tubes was bounded by assumptions in the engineering analyses.

The inspectors reviewed the design fouling factor assumptions for the RHR HXs and the engineering analyses of minimum calculated SACS flowrate to the RHR HXs. This review was performed to verify that the minimum calculated SACS flowrate, in conjunction with the heat transfer capability of the RHR HXs, supported the minimum heat transfer rates assumed during accident and transient conditions. The inspectors reviewed RHR HX modeling analyses against the HX specification sheets to ensure the analysis was valid. This included calculations related to minimum allowable SACS flowrate to the HXs. The inspectors also reviewed SW silt survey results and engineering's associated trending data and action plans.

The inspectors compared surveillance test and inspection data to the established acceptance criteria to verify that the results were acceptable and that operation was consistent with design. The inspectors walked down the selected HXs, control room instrumentation panels, the chlorination system, and the SW system to assess the material condition of these systems and components.

The inspectors also reviewed a sample of corrective action notifications related to the selected HXs, SACS, and the SW system to ensure that PSEG appropriately identified, characterized, and corrected problems related to these essential systems and components. Documents reviewed are listed in the attachment.

b. Findings

.1 Service Water Pump Packing Gland Follower Degraded

Introduction: The inspectors identified a Green, non-cited violation of 10 CFR Part 50, Appendix B, Criterion XVI, "Corrective Action," because corrective actions were not implemented for a condition adverse to quality involving inadequate procedure guidance for a SW pump packing replacement.

Description: On July 14, 2004, a PSEG equipment operator observed excessive packing leakage on the 'B' SW pump. PSEG personnel determined that the nuts on the pump packing gland had backed off and disengaged on three of the four studs. The nut remained threaded on the fourth stud; however, the stud had backed out of the pump casing. As a result, the gland rotated approximately two inches from its bolted position and caused excessive packing leakage. Operations personnel removed the 'B' SW pump from service and declared the pump inoperable due to the high packing leakage.

PSEG's apparent cause evaluation (70040441) determined that guidance contained in maintenance procedure HC.MD-CM.EA-0001(Q), Rev. 20, "Service Water Pump & Motor Removal & Replacement," was inadequate because the procedure did not include vendor manual (VTD 322416) direction to verify the required packing height and ensure the gland follower could be inserted between 1/8 and 3/16 inches into the stuffing box. (See NRC Inspection Report 50-354/2004004, Section 1R12).

On February 13, 2006, the inspectors observed during a plant walkdown that all four 'B' SW pump packing gland follower nuts were loose, lacked adequate thread engagement, and had backed off the gland follower (from 0.25" to 1.5" approximately). The 'B' SW pump was in standby at the time of discovery. Operators promptly hand-tightened the nuts, placed the 'B' SW pump in service, directed maintenance to adjust the packing nuts using procedure HC.MD-CM.EA-0001, and initiated corrective action notification 20271832. Following the packing adjustment, operators noted that the pump leak-off and packing gland temperature were within the expected range and that there was no apparent degradation in pump performance. Operators declared the pump operable and initiated a compensatory measure for increased monitoring by equipment operators.

PSEG's corrective action to address the July 2004 pump packing failure was to revise maintenance procedure HC.MD-CM.EA-0001. This was originally scheduled to be completed by September 24, 2004. The inspectors noted that PSEG extended this due date several times resulting in the issuance of HC.MD-CM.EA-0001, Revision 21 on February 24, 2005. The inspectors identified that PSEG replaced and re-packed the 'B' SW pump on October 1, 2004, using HC.MD-CM.EA-0001 (Revision 20), which did not include the additional guidance for packing and gland follower placement (60038786

operation 586). The inspectors also identified that PSEG missed an opportunity to identify this problem on May 26, 2005, when they completed a corrective action effectiveness review of the July 2004, SW bolting issue (70040441 operation 090).

PSEG documented in notification 20271832 that the identified adverse condition could unbolt the packing gland follower allowing SW pressure to drive the packing out of the stuffing box. This would result in high packing leakage and potentially starve lube water flow from the pump's lower bearing. Engineering noted that the 'B' SW pump was last in service on February 12, 2006, when it ran for ten hours without observed excessive packing leakage. Engineering later determined the degraded packing gland follower bolting condition did not adversely affect the pump's ability to perform its design function (70054180 operation 030). Engineering determined that the 'B' SW pump had remained operable from October 1, 2004, through February 13, 2006.

Analysis: A performance deficiency was identified in that PSEG did not implement corrective actions to prevent a recurring condition adverse to quality on the 'B' SW pump that was identified on February 13, 2006. The finding was more than minor because it was associated with the equipment performance attribute of the Mitigating Systems cornerstone and affected the cornerstone objective of ensuring the availability, reliability, and capability of systems that respond to initiating events. The inspectors determined the reliability of the 'B' SW pump was affected because the inspectors observed the packing gland studs were similarly backing off in July 2004, and the pump packing subsequently failed within a number of days. (Reference NRC Inspection Report 50-354/2004004, Section 1R12) In accordance with NRC Inspection Manual Chapter 0609, Appendix A, "Significance Determination of Reactor Inspection Findings for At-Power Situations," the inspectors conducted a Phase 1 SDP screening and determined the finding to be of very low safety significance (Green). The finding had a cross-cutting aspect in the area of problem identification and resolution because PSEG did not identify that corrective actions were not implemented prior to maintenance on the 'B' SW pump on October 1, 2004, during a corrective action effectiveness review performed in May 2005.

Enforcement: 10 CFR 50, Appendix B, Criterion XVI, "Corrective Action," requires, in part, that measures shall be established to assure that conditions adverse to quality are promptly identified and corrected. Contrary to the above, on October 1, 2004, PSEG failed to implement corrective actions to ensure that the packing gland follower was properly installed on the 'B' SW pump. The condition adverse to quality was observed on February 13, 2006. However, because the finding was of very low safety significance and has been entered into the corrective action program in notifications 20271832 and 20279721, this violation is being treated as a NCV, consistent with section VI.A.1 of the NRC Enforcement Policy: **NCV 05000354/2006002-01, Failure to Implement Corrective Actions for Service Water Pump Packing**.

.2 Residual Heat Removal Heat Exchanger Flow Testing Issue

The NRC safety evaluation for Technical Specification (TS) Amendment No. 94, associated with TS 4.6.2.3.b, stated, "The NRC staff concludes that the currently demonstrated flow through the residual heat removal (RHR) heat exchangers is adequate and that bypass flow is not excessive considering the selection of a butterfly valve for flow control. In addition, the proposed periodic testing of RHR heat exchanger (HX) flow, and butterfly valve leakage, will detect component degradation in a timely manner." The purpose of this periodic test (once per operating cycle) is to ensure that the design basis flow is maintained to the RHR HXs in the suppression pool cooling (SPC) mode and that the HX bypass flow is limited. The inspectors noted that PSEG appropriately documented this requirement in the TS 4.6.2.3.b bases. The TS 4.6.2.3.b bases state, in part, "by establishing a maximum 250 gpm leakage rate for the heat exchanger bypass valves and opening the test return valve fully, a constant system resistance is established for every pump test required by Surveillance Requirement 4.6.2.3.b. RHR pump degradation would then be more readily detectable if the total flow decreased between tests."

PSEG performed RHR HX flow testing using procedure HC.OP-ST.BC-0009, "Residual Heat Removal System RHR Heat Exchanger Flow Measurement - 18 Month." After reviewing the last surveillance test (ST) performed for each RHR HX, the inspectors observed that: (1) the 18-month ST did not provide direction on how to calculate RHR HX and bypass flows; (2) the 18-month ST did not provide direction on placement of ultrasonic flow instruments, calibration of these instruments, or required accuracy and range of these instruments; (3) PSEG used temporarily installed measuring and test equipment (M&TE) having a minimum accuracy of ± 0.5% for the RHR combined (HX & bypass) flow rate during the quarterly RHR pump ST, but used less accurate installed plant instrumentation for the 18 month ST; (4) PSEG did not use the recorded ultrasonic flow instrument data on the RHR HX outlet lines in their calculation of HX flow (this temporary instrument was specifically installed for this flow test); and (5) the 35 sets of recorded data for each HX appeared erratic [for 'A' RHR HX: the HX flow was 10,439 gpm with a standard deviation (STD) of 131 gpm (required flow $ 10,280 gpm); bypass flow was 200 gpm with a STD of 122 gpm (required flow # 250 gpm); for 'B' RHR HX: the HX flow was 10,349 gpm with a STD of 138 gpm; bypass flow was 239 gpm with a STD 138 gpm]. PSEG initiated notification 20272419 to evaluate these issues. In addition, the inspectors identified that engineering apparently non-conservatively calculated the 'B' RHR HX flow during the last 18 month ST (averaging the combined flow vice subtracting out the bypass flow). This resulted in engineering documenting a flow of 10,588 gpm vice an actual flow of 10,349 gpm. PSEG initiated notification 20273368 to evaluate this issue.

The inspectors determined that the RHR HX flow testing issue will be treated as an unresolved item (URI), pending completion of a technical evaluation by PSEG. An unresolved item is an issue requiring further information to determine if it is acceptable, if it is a finding, or if it constitutes a deviation or violation of NRC requirements. In this case, additional NRC review will be required to further assess PSEG's evaluation of their methodology, including instrument accuracy and uncertainty, used to calculate the

RHR HX and bypass flows once per cycle. Specifically, the NRC will assess whether the testing demonstrates that the RHR HX flow is adequate, that the HX bypass flow is within specification (does not exceed 250 gpm), and that the validity of TS 4.6.2.3.b required testing is maintained. **(URI 05000354/2006002-02, RHR HX Flow Testing Methodology)**

1R11 Licensed Operator Requalification Program (71111.11)

a. Inspection Scope (1 sample)

Resident Inspector Quarterly Review

On February 21, 2006, the inspectors observed a simulator training scenario to assess operator performance and training effectiveness. The scenario involved a marsh grass intrusion that impacted station service water, a primary condensate pump trip that caused a full recirculation system runback, a main condenser vacuum leak leading to a reactor scram, and main steam isolation valve closure. The inspectors assessed simulator fidelity and observed the simulator instructor's critique of operator performance.

b. Findings

No findings of significance were identified.

1R12 Maintenance Effectiveness (71111.12)

.1 Routine Maintenance Effectiveness Inspection

a. Inspection Scope (3 samples)

The inspectors reviewed performance monitoring and maintenance activities for the three systems or component issues identified below to determine whether PSEG was adequately monitoring equipment performance to ensure maintenance activities were effective in maintaining the equipment reliable. Specifically, the inspectors reviewed the samples listed below for items such as: (1) appropriate work practices; (2) identifying and addressing common cause failures; (3) scoping in accordance with 10 CFR 50.65(b) of the maintenance rule (MR); (4) characterizing reliability issues for performance; (5) trending key parameters for condition monitoring; (6) charging unavailability for performance; (7) classification and reclassification in accordance with 10 CFR 50.65 (a)(1) or (a)(2); and (8) appropriateness of performance criteria for structures, systems, and components classified as (a)(2). Documents reviewed are listed in the attachment.

- 'A' residual heat removal (RHR) pump breaker failure on March 1, 2006;
- 'B' technical support center chilled water system spurious start and trip on March 3, 2006; and

- ‘D’ service water strainer packing failure on November 6, 2005.

b. Findings

Introduction: The inspectors identified a Green, non-cited violation of 10 CFR 50, Appendix B, Criterion XVI, "Corrective Action," when the ‘D’ service water strainer packing failed, causing excessive leakage and resulting in the ‘D’ service water strainer being removed from service for emergent work repair.

Description: PSEG replaced the ‘D’ service water strainer under work order 60039109 during a planned service water outage from May 9-23, 2005. Maintenance technicians could not center the backwash arm shaft in the strainer lid stuffing box during strainer reassembly per procedure HC.MD-CM.EA-0003(Q), “Service Water Strainer Overhaul and Repair,” because the backwash arm was mechanically interfering with the packing gland follower. PSEG engineering instructed the maintenance personnel to increase the diameter of the gland follower by machining to remove the mechanical interference as an alternative to centering the shaft by adjusting the position of the gear reducer housing. Centering the gear reducer housing would have required machining new alignment holes in the reducer base plate because of an alignment mismatch between a base plate and strainer lid that was not discovered until reassembly. PSEG machined the gland follower, assembled the strainer, and returned the strainer to service on May 22, 2005.

Contrary to PSEG’s procedure NC.WM-AP.ZZ-0000, “Notification Process,” PSEG did not generate a notification to identify that the ‘D’ service water strainer was reassembled with a machined gland follower and the backwash arm was not centered per the overhaul procedure.

On October 3, 2005, a packing leak on the ‘D’ service water strainer was documented in notification 20254749. PSEG replaced the packing during a planned maintenance window from October 30 to November 3, 2005, under work order 60039109.

On November 4, 2005, equipment operators observed that ‘D’ service water strainer had excessive packing leakage with a portion of the packing extruding from underneath the previously machined gland follower. PSEG declared the ‘D’ service water pump inoperable on November 4, 2005, at 12:56 pm. Emergent maintenance was performed under work order 60058794 to repair the strainer. Maintenance personnel centered the backwash arm shaft in the stuffing box by centering the gear reducer above the stuffing box. Also, the packing and packing gland follower were replaced. The strainer was declared operable on November 6, 2005, at 2:02 pm.

The inspectors noted that PSEG wrote a notification to repair the strainer, but did not evaluate the cause of the equipment failure. Following discussions between the inspectors and PSEG engineers, PSEG evaluated the equipment failure under order 70052345. PSEG concluded there was inadequate implementation of the corrective action process to properly identify and correct this issue. PSEG also determined that procedure HC.MD-CM.EA-0003(Q), “Service Water Strainer Overhaul & Repair,” was

inadequately detailed to ensure the backwash arm shaft is centered. PSEG engineers recommended an enhancement to revise the procedure to include direction to position the backwash arm shaft in the stuffing box, including nominal dimensions and acceptance criteria.

Analysis: The inspectors determined that the failure to identify an as-left non-conforming condition on the 'D' SW strainer in May 2005, that consisted of the machined gland follower and un-centered backwash arm, was a performance deficiency and a finding. Specifically, PSEG did not identify a non-conforming condition by entering it in the corrective action program, which was contrary to PSEG procedure NC.WM-AP.ZZ-0000, “Notification Process.” The absence of this documentation and evaluation led to the reuse of the machined gland follower in October 2005, during reassembly of the strainer. This resulted in a packing leak on November 4, 2005, and approximately 49 hours of ‘D’ service water strainer unavailability. This finding had cross-cutting aspects in problem identification and resolution because PSEG did not properly identify a condition adverse to quality, in that the non-conforming conditions were not entered into the corrective action program.

This issue was more than minor because it was associated with the equipment performance attribute of the mitigating systems cornerstone and affected the cornerstone’s objective to ensure the availability, reliability, and capability of systems that respond to initiating events to prevent undesirable consequences. This issue also impacted the initiating events cornerstone because unavailability of one service water pump increased the likelihood of loss of service water events. In accordance with NRC Inspection Manual Chapter 0609, Appendix A, "Significance Determination of Reactor Inspection Findings for At-Power Situations," the inspectors conducted a Phase 1 SDP screening and determined a more detailed Phase 2 evaluation was required to assess the safety significance because the finding affected two cornerstones. The inspectors determined that the finding was of very low safety significance (Green). The inspectors utilized an exposure period of less than three days due to the strainer being unavailable for 49 hours. The performance deficiency directly affected the probability of a loss of service water; therefore, the likelihood of a loss of service water event was increased by one order of magnitude. All of the mitigating systems equipment listed on the Phase 2 worksheet for a loss of service water event were unaffected by the finding and operator recovery actions were credited. The most predominant core damage sequence was an inadvertent/stuck-open relief valve with a failure of high pressure coolant injection and a failure of the operators to depressurize.

Enforcement: 10 CFR 50 Appendix B, Criterion XVI, “Corrective Action,” requires, in part, that measures shall be established to assure that conditions adverse to quality are promptly identified and corrected. Contrary to the above, PSEG failed to identify that a gland follower was machined to allow the ‘D’ service water strainer to be assembled with the backwash arm not centered. This performance deficiency led to excessive packing leakage of the ‘D’ service water strainer on November 4, 2005, and the unavailability of the ‘D’ service water train for 49 hours. Because this finding is of very low safety significance and has been entered into PSEG’s corrective action program (notifications 20264237 and 20279713) this finding is being treated as a non-cited violation consistent

with Section VI.A.1 of the NRC Enforcement Policy: **NCV 05000354/2006002-03, Failure to Identify Conditions Adverse to Quality on the 'D' Service Water Strainer**.

.2 Biennial Review (71111.12B)

a. Inspection Scope (5 samples)

The inspectors conducted a review of the periodic evaluation of implementation of the maintenance rule as required by 10 CFR 50.65(a)(3) for Hope Creek. The evaluation covered a period from July 2003 to May 2005. The purpose of this review was to ensure that Hope Creek established appropriate goals and effectively assessed system performance and preventive maintenance activities. The inspectors verified that the evaluation was completed within the required time period and that industry operating experience was utilized, where applicable. Additionally, the inspectors verified that Hope Creek appropriately balanced equipment reliability and availability and made adjustments when appropriate.

The inspectors selected a sample of five risk-significant systems to verify that (1) the structures, systems, and components were properly characterized; (2) goals and performance criteria were appropriate; (3) corrective action plans were adequate; and (4) performance was being effectively monitored in accordance with station procedures. The following systems were selected for this detailed review:

- Fire Water System;
- High Pressure Coolant Injection (HPCI);
- Radiation Instrumentation;
- Safety Relief Valves (SRVs); and
- Service Water System.

These systems were either in (a)(1) status, had been in (a)(1) status at some time during the assessment period, or experienced degraded performance. The inspectors reviewed corrective action documents for malfunctions and failures of these systems to determine if system failures had been correctly categorized as functional failures and system performance was adequately monitored to determine if classifying a system as (a)(1) was appropriate.

The inspectors interviewed the maintenance rule coordinator, engineering supervisors, and system engineers. Documentation for applicable systems and a sample of condition reports were also reviewed by the inspector. Documents reviewed are listed in the attachment.

b. Findings

No findings of significance were identified.

1R13 Maintenance Risk Assessments and Emergent Work Control (71111.13)

a. Inspection Scope (5 samples)

The inspectors reviewed five on-line risk management evaluations through direct observation and document reviews for the following configurations:

- 'B' diesel area panel room supply ventilation fan inoperability during 'C' emergency diesel generator planned maintenance on January 11, 2006;
- 'A' station auxiliaries cooling system (SACS) pump inoperability during 'B' channel maintenance and testing week on January 19, 2006;
- High grassing condition during 'D' service water strainer planned maintenance on February 13, 2006;
- 'B' technical support center chilled water system unavailability from March 3 through March 8, 2006; and
- Trip of 'A' and 'B' control room chillers on March 14, 2006.

The inspectors reviewed the applicable risk evaluations, work schedules and control room logs for these configurations to verify that concurrent planned and emergent maintenance and test activities did not adversely affect the plant risk already incurred with these configurations. PSEG's risk management actions were reviewed during shift turnover meetings, control room tours, and plant walkdowns. The inspectors also used PSEG's on-line risk monitor (Equipment Out Of Service workstation) to gain insights into the risk associated with these plant configurations. Finally, the inspectors reviewed notifications documenting problems associated with risk assessments and emergent work evaluations. Documents reviewed are listed in the attachment.

b. Findings

No findings of significance were identified.

1R14 Operator Performance During Non-Routine Evolutions and Events (71111.14)

a. Inspection Scope (2 samples)

The inspectors evaluated PSEG's performance and response during non-routine evolutions to determine whether the operator responses were consistent with applicable procedures, training, and PSEG's expectations. The inspectors observed control room activities and reviewed control room logs and applicable operating procedures to assess operator performance. PSEG's evaluations of operator performance were also reviewed. The inspectors walked down control room displays and portions of plant systems to verify status of risk significant equipment and interviewed operators and engineers. Documents reviewed are listed in the attachment.

Reactor Recirculation Pump Vibration Monitoring. The inspectors periodically monitored reactor recirculation pump performance and verified that reactor recirculation pump vibration monitoring equipment was maintained to implement commitments to NRC

Confirmatory Action Letter (CAL) 1-05-001. The inspectors also reviewed operations and engineering department personnel response to vibration alarms on the 'A' and 'B' reactor recirculation pumps between January 1 and March 31, 2006, that occurred when operators changed pump speed in accordance with plant procedures. The alarm conditions were documented in corrective action notifications 20267957 and 20270414. The inspectors verified that operators properly responded to these alarms in accordance with alarm response procedure HC.OP-AR.ZZ-0008(Q), Rev. 30, "Overhead Annunciator Window Box C1," and abnormal procedure HC.OP-AB.RPV-0003(Q), Rev. 10, "Recirculation System/Power Oscillations." The inspectors also verified implementation of engineering procedure HC.ER-AP.BB-0001(Q), Revs. 4 and 5, "Reactor Recirculation Pump/Motors Vibration Monitoring." The inspectors, with assistance from personnel in the Office of Nuclear Reactor Regulation (NRR), Division of Engineering, reviewed PSEG's evaluation of the alarm conditions which concluded, in each case, the condition experienced was not representative of shaft cracking.

b. Findings

No findings of significance were identified.

1R15 Operability Evaluations (71111.15)

b. Inspection Scope (6 samples)

The inspectors reviewed six issues involving potentially degraded plant equipment associated with:

- 'A' service water pump IST adverse trend reported on January 20, 2006;
- 'B' technical support center (TSC) chilled water system spurious start and trip on March 3, 2006;
- 'D' service water strainer gear box shear pin failure and scored backwash arm shaft on February 12, 2006;
- Operability Determination 70053797 associated with safety auxiliaries cooling valves found throttled incorrectly during engineering review on February 13, 2006;
- Drywell cooler condensate flow meter operability on February 22, 2006; and
- Control room and TSC chilled water pumps requiring frequent oil additions on March 2, 2006.

The inspectors reviewed the technical adequacy of the operability determinations to ensure the conclusions were justified. The inspectors interviewed engineers and operators and discussed issues with PSEG management when potential issues existed with no formal operability evaluation. The inspectors also walked down accessible equipment to corroborate the adequacy of PSEG's operability determinations. Additionally, the inspectors reviewed other PSEG identified safety-related equipment deficiencies during this report period and assessed the adequacy of their operability screenings. Notifications and documents reviewed in this regard are listed in the attachment.

c. Findings

No findings of significance were identified.

1R17 Permanent Plant Modifications (71111.17)

a. Inspection Scope (1 sample)

The inspectors reviewed the following design change:

- Order 80057204, equivalent change package for replacing butterfly valves in the safety auxiliary cooling system with a different style valve.

The design bases, licensing bases, modification instructions and post-modification testing of the affected components were reviewed to verify the performance capability of this equipment was not adversely affected. The inspectors reviewed the applicable technical specifications for this equipment to ensure that operability requirements and allowable outage time limits were met. The inspectors also reviewed notifications documenting deficiencies identified related to permanent plant modifications. The documents reviewed as part of these inspections are listed in the attachment.

b. Findings

No findings of significance were identified.

1R19 Post-Maintenance Testing (71111.19)

a. Inspection Scope (6 samples)

The inspectors reviewed the six post-maintenance tests listed below to verify that procedures and test activities ensured system operability and functional capability. The inspectors reviewed test procedures to verify the procedure adequately tested the safety functions that may have been affected by the maintenance activity and the acceptance criteria in the procedure were consistent with the UFSAR and other design basis documentation. The inspectors also witnessed the test or reviewed the test data to verify test results adequately demonstrated restoration of the affected safety functions. Documents reviewed are listed in the attachment.

- WOs 30047121, 50077555, 50077541, high pressure coolant injection (HPCI) motor-operated valves 1BJHV-F004, 1BJHV-F059, and 1APHV-F011 on January 3, 2006;
- WO 30110360, ‘C’ emergency diesel generator on January 14, 2006;
- WO 30133318, ‘B’ intermediate range neutron monitor on January 19, 2006;
- WO 60038972, ‘B’ control room emergency filtration train on January 26, 2006;
- WO 50091404, ‘A’ station auxiliaries cooling water pump on February 2, 2006; and

- WO 60060628, 'B' primary containment instrument gas compressor on February 16, 2006.

b. Findings

No findings of significance were identified.

1R22 Surveillance Testing (71111.22)

a. Inspection Scope (5 samples)

The inspectors witnessed surveillance tests or reviewed test data of five risk-significant structures, systems, and components (SSCs) listed below to assess whether the SSCs met the requirements of the technical specifications, UFSAR, and other plant design documents. The inspectors also determined whether the testing effectively demonstrated that the SSCs were operationally ready and capable of performing their intended safety functions. Documents reviewed are listed in the attachment.

- Reactor coolant system leakage detection daily surveillance data (drywell floor sump and air cooler condensate flow rates) on January 20, 2006;
- 'A' residual heat removal pump inservice test on February 2, 2006;
- 'B' & 'D' core spray pumps inservice test on February 16, 2006;
- High pressure coolant injection main and booster pump set inservice test on February 28, 2006; and
- Redundant reactivity control system division 1 channel A ATWS recirculation pump trip functional test on March 28, 2006.

b. Findings

No findings of significance were identified.

4. OTHER ACTIVITIES

4OA2 Identification and Resolution of Problems (71152)

.1 Review of Items Entered into the Corrective Action Program

As required by Inspection Procedure 71152, Identification and Resolution of Problems, and in order to help identify repetitive equipment failures or specific human performance issues for follow-up, the inspectors performed a daily screening of all items entered into PSEG's corrective action program. This was accomplished by reviewing the description of each new notification and attending daily management review committee meetings.

.2 Annual Sample: Review of Repetitive Control Room and TSC Chiller Problems

a. Inspection Scope

The inspectors reviewed PSEG's actions to resolve problems with guide vane actuator linkage joints on refrigerant compressor units servicing chilled water systems. The guide vane actuator joints consist of two joints in the linkage, made up of a shaft and an arm that slides on the shaft and is held in place with three setscrews. Two control room chillers, 1AK400 and 1BK400, and two TSC chillers, 1AK403 and 1BK403, utilize this linkage. The inspectors reviewed LERs, notifications, evaluations, system health reports, vendor documents, and the UFSAR to understand the design, function, and failure history of the chillers. Engineers, maintenance supervisors, and other PSEG staff were interviewed to understand design and maintenance issues with the chillers. Problem resolution efforts were discussed with plant management.

The following equipment issues were documented associated with control room chiller guide vane linkage problems:

On May 20, 2004, the 'B' control room chiller was declared inoperable due to evaporator pressure exceeding a high set point. The resulting evaluation determined that the setscrews holding a pivot arm to the guide vane shaft were not adequately engaged to prevent the setscrews from slipping on the shaft. This failure was the subject of LER 05000354/2004-005-00 that appears in NRC Inspection Report 05000354/2004004.

On May 12, 2005, the 'A' control room chiller was declared inoperable when plant personnel discovered arm-to-shaft slippage on another joint in the linkage associated with the guide vane actuator shaft. The slippage resulted in the chiller failing to maintain chilled water temperature at its design value. PSEG determined the slippage occurred due to loose setscrews in the guide vane actuator shaft-to-arm joint. PSEG's evaluation determined that internal and external operating experience was not used effectively to improve station maintenance procedures and training using improved practices for setting fastener parts and devices. This failure was the subject of LER 05000354/2005-004-00 that appears in section 4OA3 of this report.

On December 8, 2005, the 'B' control room chiller was declared inoperable when equipment operators found the guide vane actuator arm slipping with respect to the shaft. PSEG secured the chiller to implement repairs that resulted in 9 hours of unavailability. PSEG had implemented a temporary log reading that required operators to check the status of arm to shaft slippage once per day. It was during this log reading that the slippage was identified. PSEG determined the slippage was due to inadequate setscrew engagement into the actuator shaft. PSEG also determined that inadequate instructions existed for technicians to machine dimples into the shaft to increase setscrew holding power. A licensee-identified violation associated with this issue is described in section 4OA7 of this report.

b. Observations and Findings

No findings of significance were identified.

The inspectors observed that apparent cause evaluations performed for these conditions did not consistently include some aspects of procedure NC.CA-TM.ZZ-0005(Z), “Apparent Cause Evaluation Guideline.” Specifically, the extent of condition and cause determinations, operating experience reviews, and maintenance practice reviews did not fully evaluate the as-found and as-left chiller linkage and fastener conditions and maintenance assembly practices.

The inspectors also noted incomplete documentation of vendor communications in accordance with procedure NC.CC-AP.ZZ-0043(Q), "Vendor Information Program." In some instances, conversations between the vendor and PSEG staff with respect to the chiller linkage problems were not documented. However, vendor information was used appropriately by PSEG to correct the specific problems.

.3 Annual Sample: Review of Extended Containment Boundary Change Problems

a. Inspection Scope

The inspectors selected notification 20265946 for detailed review. The notification was written to address the effect on the primary containment boundary when manual valve 1-AP-V044 was opened to support plant evolutions. Valve 1-AP-V044 isolates the residual heat removal (RHR) system from the condensate storage and transfer (CST) system. PSEG updated the UFSAR to move an extended containment boundary from manual isolation valve 1-AP-V044 to a set of two check valves, 1-AP-V042 and 1-AP-V043, which were downstream of the manual isolation valve. This change allowed PSEG to leave manual valve 1-AP-V044 open and use the condensate transfer system as an alternate keep-fill system when the normally-used system jockey pump is unavailable.

The inspectors reviewed notifications, interviewed plant personnel and reviewed associated documents to ensure the full extent of the issue was identified, an appropriate evaluation was performed, and appropriate corrective actions were developed and implemented. Documents reviewed are listed in the attachment.

b. Findings and Observations

No findings of significance were identified.

The inspectors observed that because PSEG referenced check valves, 1-AP-V042 and 1-AP-V043, as part of a keep-fill system in the UFSAR, only one check valve was tested in accordance with the IST program. Inspectors determined that both check valves should have been tested because the two check valves, as a pair, form the extended containment boundary. Inspectors concluded that the issue was minor because one check valve was tested satisfactorily under the IST program, the check valves are of a

simple design, and maintenance records indicated no significant issues with either check valve. PSEG entered the deficiency into their corrective action program under order 70053532.

.4 Safety Conscious Work Environment Metric Review

a. Inspection Scope

The inspectors reviewed PSEG's progress in addressing safety conscious work environment (SCWE) issues that were discussed in the NRC's annual assessment letter dated March 3, 2006. In that letter, the NRC staff documented a SCWE substantive cross-cutting issue and stated the NRC's intention to continue to monitor progress in this area.

On February 23, 2006, and March 1, 2006, the inspectors conducted a sampling review of PSEG's SCWE metrics, or performance indicators (PIs), for fourth quarter 2005. Documents reviewed are listed in the attachment.

b. Findings and Observations

No findings of significance were identified.

In fourth quarter 2005, PSEG identified twenty-one PIs as being green or satisfactory while eight PIs were identified as red or needing improvement. This was an improvement from the first quarter 2005, when there were seventeen green PIs and thirteen red PIs. A PI that monitored management attendance at SCWE training was eliminated because the training was completed.

4OA3 Event Followup (71153)

.1 (Closed) LER 05000354/2005-004-00, 'A' Control Room Emergency Filtration (CREF) Train Inoperable with 'B' CREF Out of Service

a. Inspection Scope

On May 12, 2005, PSEG discovered the guide vane pivot arm for the 'A' control room chiller, 1AK400, slipped relative to the guide vane shaft. The 1AK400 chiller supplies chilled water to control room emergency filtration (CREF) system, vital switchgear room ventilation trains, and SACS pump room ventilation trains. The arm slippage affected the ability of the 1AK400 to reliably remove heat from the chilled water system. The 1BK400 chiller was out of service for scheduled maintenance activities during the time the 1AK400 was exhibiting vane pivot arm slippage. A follow-up operability assessment performed several weeks later concluded that with the guide vane pivot arm slippage, the1AK400 chiller was not capable of performing its design function of maintaining temperatures in the control room envelope during normal and accident conditions. A review of plant data determined that the guide vane slippage for the 1AK400 chiller most likely started at approximately 9:50 a.m. on May 9, 2005. The 'A' CREF train was

inoperable for approximately 85 hours. With the 'B' CREF train inoperable during this same time period, Technical Specification (TS) 3.0.3 would have been applicable for having both trains of CREF inoperable. The inspectors reviewed the LER and associated evaluations. The enforcement action associated with the violation of Technical Specification 3.0.3 is described in Section 4OA7. This LER is closed.

b. Findings

Introduction: A Green, self-revealing non-cited violation of 10 CFR 50 Appendix B, Criterion XVI, "Corrective Action," was identified when the guide vane pivot arm on the 1AK400 control room chiller was discovered to be operating incorrectly, rendering the chiller unable to perform its design function.

Description: On May 20, 2004, PSEG discovered that the 'B' control room chiller, 1BK400, was not operating correctly. Specifically, the chiller evaporator pressure was higher (61 psig) than the required operating band of 35 to 50 psig. The chiller was declared inoperable. PSEG discovered the 1BK400 guide vane pivot arm was slipping on the drive shaft. PSEG determined that the chiller was not capable of performing its design function of maintaining temperatures within the control room envelope during normal operating and accident conditions.

PSEG performed an apparent cause evaluation under order 70039481. PSEG identified that improper assembly of the guide vane pivot arm led to the inoperability of the 'B' CREF on May 20, 2004, and directed an apparent cause evaluation be performed in accordance with procedure NC.CA-TM.ZZ-0005(Z), Rev. 3, "Apparent Cause Evaluation Guideline." PSEG documented that the improper assembly was due to inadequate engagement of setscrews on the guide vane shaft. PSEG determined that the setscrew engagement problem was due to inadequate procedural guidance. Specifically, the maintenance procedure used to overhaul the chiller, HC.MD-CM.GJ-0001(Q), Rev. 12, "Water Chiller Unit & Compressor Overhaul," did not provide instructions to dimple the shaft. Dimpling the shaft required technicians to drill an indentation in the shaft where the setscrew would contact the shaft, improving the holding power of the setscrew. PSEG noted, through review of industry operating experience, that other stations addressed similar setscrew engagement problems by dimpling the shaft.

PSEG corrective actions for the May 20, 2004, failure of 1BK400 included revising the chiller overhaul procedure to include dimpling of the guide vane shaft and providing post-maintenance testing criteria in existing maintenance items to include monitoring of evaporator pressure.

On May 12, 2005, PSEG discovered a related issue on the 'A' control room chiller. The guide vane arm slipped approximately 20 degrees on the 'A' control room chiller (1AK400) guide vane actuator shaft. PSEG declared the 1AK400 chiller inoperable at 9:50 p.m. and performed corrective maintenance under work order 60054534. PSEG determined from a review of plant data the 1AK400 chiller was likely inoperable from May 9, 2005, at 9:50 a.m. until May 12, 2005, at 10:53 p.m.

Maintenance technicians discovered the three setscrews holding the drive arm on the shaft were loose and two of the three setscrews in the vane actuating arm were also loose. Technicians also determined that thread adhesive was not present on the setscrews. Thread adhesives are compounds used to enhance mechanical joints to reduce the likelihood of threaded fasteners from loosening.

PSEG performed an apparent cause evaluation under order 70047411. PSEG determined that the failure of the 1AK400 chiller was due to loose setscrews on the guide vane pivot and actuating arms. PSEG determined the apparent cause was inadequate use of industry operating experience for setting setscrews. PSEG found that some common practices of minimizing loosening of threaded fasteners were not incorporated into station procedures, work orders, or maintenance training.

PSEG determined in order 70047411 that corrective actions from the evaluation of the failure of the 'B' control room chiller on May 20, 2004, were not adequately identified and added to maintenance procedures or work orders. Specifically, industry operating experience and standards were not used such that thread adhesives were not added to work order material lists and guidance to verify tightness or torque was not added to procedures. Also, the apparent cause evaluation documented in order 70039481 did not examine the extent of cause of improper assembly of a guide vane arm and shaft with setscrews as a locking device as it applied to the other arm and shaft assembly on the guide vane actuator that was in the same linkage assembly.

PSEG's corrective actions included modifying procedure SH.MD-GP.ZZ-0022, “Bolt Torquing and Bolting Sequence Guidelines,” and HC.MD-GP.ZZ-0245, “Hope Creek Carrier Centrifugal Chiller Frequent & Periodic Inspections (Overhaul),” to incorporate guidance contained in industry guidelines and utilize double verification of tightness or torque of fastener parts, and to incorporate the use of thread adhesives into appropriate maintenance procedures. PSEG also provided training to maintenance technicians qualified to perform assembly of arms and linkages.

Analysis: Inspectors determined that the failure to correct deficiencies related to the improper assembly of guide vane linkages on the 1AK400 chiller guide vane arm linkages was a performance deficiency and a finding. PSEG did not perform an adequate apparent cause evaluation for the 'B' control room chiller, as documented in order 70039841, which led to the failure to identify conditions adverse to quality associated with maintenance practices on the guide vane actuator shaft joint assembly.

This finding was more than minor because it was associated with the equipment performance attribute of the Mitigating Systems cornerstone and affected the cornerstone objective to ensure the availability, reliability, and capability of systems that respond to initiating events to prevent undesirable consequences. The improper installation of setscrews on the 1AK400 chiller guide vane arms resulted in the chiller not being able to perform its design function and unplanned unavailability of the chiller to implement repairs. The 1AK400 chiller was inoperable for approximately 85 hours. The inspectors completed a Phase 1 screening using Appendix A of Inspection Manual Chapter (IMC) 0609, “Determining the Significance of Reactor Inspection Findings for

At-Power Situations," and determined that the performance deficiency was of very low safety significance (Green) because the finding was not a design or qualification deficiency, did not represent a loss of system safety function, did not represent an actual loss of safety function of a single train greater than its technical specification allowed outage time, and did not screen as risk significant due to external events.

Enforcement: 10 CFR 50, Appendix B, Criterion XVI, "Corrective Action," requires, in part, that measures shall be established to assure that conditions adverse to quality are promptly identified and corrected. Contrary to the above, PSEG failed to identify inadequate maintenance practices associated with the 'A' control room chiller guide vane arm linkages after the 'B' chiller failed in a similar manner on May 12, 2004. As a result, the 'A' control room chiller was rendered unavailable for 85 hours on May 9, 2005. PSEG determined the apparent cause evaluation documented in order 70039481 did not identify relevant industry operating experience and industry practices related to setscrew installation and should have been incorporated into maintenance procedures or instructions for the guide vane actuator for the 'A' chiller. Because this finding is of very low significance and has been entered into PSEG's corrective action program in notifications 20238229, 20254263, and 20264705, this violation is being treated as an NCV, consistent with section VI.A.1 of the NRC Enforcement Policy: **NCV 05000354/2006002-04, Inadequate Corrective Action Results in Unavailability of the 1AK400 Control Room Chiller**.

.2 Unplanned Power Reduction on January 14, 2006

a. Inspection Scope

The inspectors responded to an unplanned power reduction on January 14, 2006. An electrical fault in non-vital 13kV bus-work related to the #4 station lighting transformer caused the loss of the offgas recombiner train. At 2:48 a.m., operators began a power reduction to 80% power in response to degrading main condenser vacuum due to the loss of the offgas system. High vibration alarms were received on the 'A' and 'B' reactor recirculation pumps in the control room during the power reduction. Operators reduced power to 71% in accordance with station alarm response procedures to clear the alarming condition. Power was reduced again to approximately 60% to perform planned control rod scram time testing. The inspectors discussed the transient with operators, engineers, and plant management to understand the occurrence and assess PSEG's evaluation of the cause and followup actions. The inspectors reviewed operator actions and station procedures to verify proper actions were taken and plant equipment responded as expected. The inspectors assessed PSEG's apparent cause determination and proposed corrective actions prior to power ascension. The inspectors later reviewed PSEG's root cause evaluation of the issue.

PSEG determined the cause of the electrical fault to be insulation breakdown due to conduction across a dislodged electrical bus insulating boot combined with a high moisture environment. PSEG determined that the original design of the non-safety related bus enclosure did not include heaters to control moisture and condensation.

PSEG also determined that the insulating boot likely fell off the bus duct due to improper or missing fasteners. PSEG corrective actions included inspecting other outdoor switchgear and panels for installation of space heaters and evidence of moisture-induced degradation, recommending to plant management installation of bus duct heaters for the non-safety related station lighting transformers, and installing insulating boots in accordance with vendor installation instructions.

b. Findings

No findings of significance were identified.

.3 Reactor Recirculation Pump Runback on February 4, 2006

The inspectors responded to a reactor recirculation pump runback on February 4, 2006. During scheduled swapping of main generator stator water cooling (SWC) pumps, the 'A' SWC pump breaker failed to close on the first attempt. Operators attempted to close the breaker again. The control room received a report of light smoke from the breaker and secured power to 125V bus 10B110. The loss of power to non-safety related bus 10B110 caused a loss of indication to the suction valve of the 'A' primary condensate pump (PCP). The 'A' PCP then tripped by design on an interlock that monitors the status of its suction valve. The loss of the 'A' PCP caused a reactor recirculation runback by design that reduced reactor power from 100% to approximately 53% power. The inspectors discussed the transient with operators, engineers, and plant management to understand the event and assess PSEG's evaluation of the cause and followup actions. The inspectors reviewed operator actions, station procedures, and plant response to verify proper actions were taken and plant equipment responded as expected. The inspectors assessed PSEG's apparent cause determination and proposed corrective actions prior to power ascension. The inspectors subsequently reviewed PSEG's apparent cause evaluation of the event and equipment issues.

PSEG determined the non-safety related control relay on the 'A' SWC pump breaker to be the source of the smoke. No fire was observed. The breaker was shipped to the vendor for failure analysis. PSEG is tracking the failure analysis under order 70053837.

b. Findings

No findings of significance were identified.

4OA6 Meetings, Including Exit

On April 3, 2006, the inspectors presented their overall findings to members of PSEG management led by Messrs. Barnes and Massaro. None of the information reviewed by the inspectors was considered proprietary.

On April 7, 2006, the inspectors met with Mr. Massaro to discuss a change in status of a finding presented at the exit meeting on April 3, 2006.

4OA7 Licensee-Identified Violations

The following violations of very low safety significance (Green) were identified by PSEG and are violations of NRC requirements which meet the criteria of Section VI of the NRC Enforcement Policy, NUREG-1600, for being dispositioned as non-cited violations.

- Technical Specification (TS) 3.7.2 requires that two independent control room emergency filtration (CREF) system subsystems be operable. Contrary to the above requirement, PSEG identified that both the ‘A’ and ‘B’ trains of CREF were inoperable for approximately 83 hours, from May 9 through 12, 2005, due to the 'B' chiller being out of service for planned maintenance and the 'A' chiller being inoperable due to guide vane actuator slippage. The performance deficiency resulted in the 'A' CREF train being unavailable for 85 hours. PSEG entered this issue into the corrective action program in notification 20238229. In accordance with IMC 0609, Appendix A, “Significance Determination of Reactor Inspection Findings for At-Power Situations,” the inspectors conducted a Phase 1 SDP Screening and determined this finding to be of very low safety significance (Green). This finding screened to Green because the finding did not represent an actual loss of safety function of a single train for greater than its TS allowed outage time. This event is described in LER 05000354/2005-004-00 and in Section 4OA3 of this report.

- 10 CFR 50, Appendix B, Criterion V, “Instructions, Procedures, and Drawings,” requires, in part, that activities affecting quality shall be prescribed by documented instructions, procedures, or drawings, of a type appropriate to the circumstances. Contrary to the above requirement, PSEG did not provide adequate work instructions for technicians to assemble a mechanical joint on the 1BK400 control room chiller vane actuator arm assembly. As a result, on December 8, 2005, the 1BK400 chiller guide vane actuator arm was found by equipment operators to be malfunctioning, resulting in the 1BK400 being declared inoperable and removed from service for repair. This was licensee-identified because an equipment operator observed this on a required round initiated to monitor for this potential problem. The 1BK400 chiller was unavailable for approximately 21 hours on December 8 and 9, 2005. PSEG entered the deficiency in their corrective action program under notification 20264293. In accordance with IMC 0609, Appendix A, this finding was of very low safety significance (Green), because the finding was not a design or qualification deficiency, did not represent a loss of system safety function, did not represent an actual loss of safety function of a single train for greater than its TS allowed outage time, did not represent an actual loss of safety function of one or more non-Technical Specification Trains of risk significant equipment per 10CFR50.65, for greater than 24 hours, and did not screen as potentially risk significant due to external events.

- 10 CFR 50, Appendix B, Criterion III, “Design Control,” requires, in part, that design changes, including field changes, shall be subject to design control measures commensurate with those applied to the original design. Contrary to

the above requirement, PSEG replaced two valves in the safety auxiliaries cooling system (SACS) without ensuring they meet the design requirement of the valves being replaced. The two new valves were of a different design than the two replaced and their installation resulted in a different flow balance in the SACS. PSEG entered this issue into their corrective action program as notification 20271798. In accordance with IMC 0609, Appendix A, "Significance Determination of Reactor Inspection Findings for At-Power Situations," the inspectors conducted a Phase 1 SDP Screening and determined the finding to be of very low safety significance (Green). This finding screened to Green because the finding was a design deficiency confirmed not to result in loss of operability per "Part 9900, Technical Guidance, Operability Determination Process for Operability and Functional Assessment."

ATTACHMENT: SUPPLEMENTAL INFORMATION

SUPPLEMENTAL INFORMATION

KEY POINTS OF CONTACT

Licensee personnel

G. Barnes, Site Vice President
M. Massaro, Plant Manager
D. Benyak, Regulatory Assurance Director
J. Barstow, Licensing
M. Pfizenmaier, Senior Manager Plant Engineering
A. Shabazian, Maintenance Rule Coordinator
K. Knaide, Manager - Engineering Programs
A. Tramontana, NSSS Branch Manager
S. Afarian, HPCI System Engineer
J. Anthes, Service Water System Engineer
M. Kelly, Chilled Water System Engineer

LIST OF ITEMS OPENED, CLOSED, AND DISCUSSED

Opened

05000354/2006002-02	URI	RHR HX Flow Testing Methodology (Section 1R07.2)

Opened/Closed

05000354/2006002-01	NCV	Failure to Implement Corrective Actions for Service Water Pump Packing (Section 1R07.1)
05000354/2006002-03	NCV	Failure to Identify Conditions Adverse to Quality on 'D' Service Water Strainer (Section 1R12)
05000354/2006002-04	NCV	Inadequate Corrective Action Results in Unavailability of the 1AK400 Control Room Chiller (Section 4OA3.1)

Closed

05000354/2005-004-00	LER	'A' Control Room Emergency Filtration (CREF) Train Inoperable with 'B' CREF Out of Service (Section 4OA3.1)

LIST OF DOCUMENTS REVIEWED

In addition to the documents identified in the body of this report, the inspectors reviewed the following documents and records:

Hope Creek Generating Station (HCGS) Updated Final Safety Analysis Report
HCGS NCO Narrative Logs
HCGS Plant Status Reports
Weekly Reactor Engineering Guidance to Hope Creek Operations
Hope Creek Operations Night Orders and Temporary Standing Orders
Risk-Informed Inspection Notebook For Hope Creek Generating Station, Rev. 2
SH.OP-AP.ZZ-0108, Technical Specification Action Statement Logs

Section 1R01: Adverse Weather Protection

Procedures
SH.OP-AP.ZZ-0011, Attachment 4, Seasonal System Readiness Review, Rev. 4
SH.OP-AP.ZZ-0011, Attachment 11, Hope Creek Grassing Readiness Template

Corrective Action Notifications
20233532 20232452 20263699 20234657

Evaluations
70046270 70046272 70052199

Other Documents
Detritus Risk Assessments for January-March, 2006

Section 1R04: Equipment Alignment

Procedures
HC.OP-SO.KJ-0001(Q), Rev. 2, Emergency Diesel Generator Operation
HC.OP-AB.ZZ-0170(Q), Rev. 2, Loss of 4.16kV Bus 10A401 A Channel
HC.OP-AB.ZZ-0135(Q), Rev. 23, Station Blackout // Loss of Offsite Power // Diesel Generator Malfunction
HC.OP-AR.KJ-0003(Q), Rev. 15, Diesel Generator Remote Engine Control Panel 1BC423
HC.OP-SO.BH-0001(Q), Rev. 9, Standby Liquid Control System Operation
HC.OP-IS.BH-0001(Q), Rev. 42, Standby Liquid Control Pump - AP208 - Inservice Test
HC.OP-IS.BH-0002(Q), Rev. 42, Standby Liquid Control Pump - BP208 - Inservice Test
HC.OP-IS.BH-0101(Q), Rev. 7, Standby Liquid Control System Valves - Inservice Test
HC.OP-ST.BH-0001(Q), Rev. 5, SLC Valve Operability Test - Monthly
HC.CH-SA.BH-0001(Q), Rev. 11, Sampling The Standby Liquid Control System
HC.OP-SO.BC-0001(Q), Rev. 41, Residual Heat Removal System Operation
HC.OP-ST.BC-0001(Q), Rev. 14, RHR System Piping and Flow Path Verification - Monthly

HC.OP-ST.BE-0001(Q), A Core Spray Loop System Piping and Flow Path Verification - Monthly, Rev. 8
HC.OP-IS.BE-0001(Q), A & C Core Spray Pumps - AP206 and CP206 - In-Service Test, Rev. 36
HC.OP-SO.BE-0001(Q), Core Spray System Operation, Rev. 9
HC.OP-ST.EG-0001(Q), SACS Flow Path Verification - Monthly, Rev. 6

Drawings
M-11-1(Q) Safety Auxiliaries Cooling Reactor Building, Sheet 1, Rev. 17
M-12-1(Q) Safety Auxiliaries Cooling Auxiliary Building, Rev. 13
M-30-1(Q), Sheet 1, Rev. 19, Diesel Engine Auxiliary Systems Fuel Oil
M-30-1(Q), Sheet 2, Rev. 10, Diesel Engine Auxiliary Systems Intercooler and Injector Cooling, Jacket Water, Crankcase Vacuum Air Intake, Exhaust, and Vibration Monitoring Systems
M-30-1(Q), Sheet 3, Rev. 12, Diesel Engine Auxiliary Systems Starting Air and Lube Oil
M-48-1(Q), Standby Liquid Control, Sheet 1, Rev. 11
M-52-1(Q),Core Spray, Sheet 1, Rev. 20
1-P-BH-01, System Isometric / Reactor Building Standby Liquid Control (Pump Suction), Sheet 1, Rev. 8
M-51-1(Q), Residual Heat Removal, Sheet 1, Rev. 36
M-51-1(Q), Residual Heat Removal, Sheet 2, Rev. 34

Corrective Action Notifications

20269959	20150111	20201713	20212948	20236196	20265782
20270063	20179287	20212946	20263367	20267054	20269878
20052805	20182507	20212947	20263592	20265663	20273430

Evaluations

70052581	70047282	80074240	80087237	70044148

Work Orders

60049564	60015093	60044425	60058674

Other Documents
Hope Creek Generating Station (HCGS) Updated Final Safety Analysis Report, Section 7.4.1.2, “Standby Liquid Control System”
HCGS Safety Evaluation Report, Section 7.4.2.4, “Standby Liquid Control System”
HCGS Technical Specification 3/4.1.5, “Standby Liquid Control System”
NRC Regulatory Guide 1.75, Rev. 3, “Criteria for Independence of Electrical Safety Systems”
NRC Information Notice 90-26, “Inadequate Flow of Essential Service Water to Room Coolers and Heat Exchangers for Engineered Safety-Feature Systems”
NRC Information Notice 96-60, “Potential Common-Mode Post-Accident Failure of Residual Heat Removal Heat Exchangers”
Vendor Technical Document (VTD) PNO-C41-A001-0011, Rev. 0, “Standby Liquid Control Storage Tank”
VTD PNO-C41-A001-0039, Rev. 0, “Standby Liquid Control Storage Tank”
VTD PNO-C41-C001-0005, Rev. 2, “Standby Liquid Control System Pump - Data Sheet”
VTD PNO-C41-C001-0007, Rev. 1, “Requirements for Standby Liquid Control System Pump”

VTD PN1-C41-C001-0042, Rev. 0, “Storage Procedure for Standby Liquid Control Pumps”
D3.36, Design, Installation, and Test Specification for the Core Spray System, Rev. 5
NRC Bulletin 88-04, Potential Safety-Related Pump Loss
NLR-N88093, Response to NRC Bulletin 88-04, Hope Creek Generating Station, July 12, 1988
NRC Information Notice 90-61, Potential for Residual Heat Removal Pump Damage Caused By Parallel Pump Interaction
NUREG-0933 - Issue 159, Qualification of Safety-Related Pumps While Running on Minimum Flow, Rev. 1
Hope Creek IST Component Requirement Manual, Rev. 2

Section 1R05: Fire Protection

Procedures
Hope Creek Pre-Fire Plan FRH-II-511, Diesel Fuel Oil Storage Tanks Area Elevation 54' 0" Rev. 5
Hope Creek Pre-Fire Plan FRH-II-422, RHR Heat Exchanger Room & MCC Area Elevation 77' 0", Rev. 5
Hope Creek Pre-Fire Plan FRH-II-423; MCC Area, RHR Heat Exchanger Room, Safeguard Instrument Rooms and RACS Pumps and Heat Exchanger Area Elevation 77' 0", Rev. 4
Hope Creek Pre-Fire Plan FRH-II-412, RCIC Pump and Turbine Room, RHR Pump and Heat Exchanger Rooms and Electrical Equipment Room Elevation 54' 0", Rev. 3
Hope Creek Pre-Fire Plan FRH-II-413, HPCI Pump and Turbine Room, RHR Pump and Heat Exchanger Rooms Elevation 54', Rev. 3
Actions For Inoperable Fire Protection - Hope Creek Station, HC.FP-AP.ZZ-0004, Rev. 9
Salem and Hope Creek Fire Impairment Log Book dated 1/4/06

Corrective Action Notifications
20246779

Section 1R06: Flood Protection Measures

Drawing
P-8271-1, Plumbing & Drainage Auxiliary Bldg-DG. Area Plan at Elevation 54' 0" Area 27, Rev. 6
P-8000-0, Room Flood Control Oily Normal Waste System, SHT 2, Rev. 2

Corrective Action Notifications
20266696

Section 1R07: Heat Sink Performance

Procedures
HC.OP-FT.EA-0001, Rev. 5, Validating SSWS Flow Through SACS HXS
HC.OP-ST.BC-0009, Rev. 4, Residual Heat Removal System RHR Heat Exchanger Flow Measurement - 18 Month

HC.OP-AB.COOL-0005, Rev. 0, Total Loss of Station Service Water
HC.OP-AB.MISC-0001, Rev. 6, Act of Nature
HC.OP-SO.EA-0001, Rev. 27, Service Water System Operation
HC.OP-SO.EP-0001, Rev. 15, Service Water Traveling Screens System Operation
HC.OP-SO.BC-0001, Rev. 41, Residual Heat Removal System Operation
HC.OP-AB.COOL-0001, Rev. 7, Station Service Water
HC.OP-AB.COOL-0002, Rev. 0, Safety/Turbine Auxiliaries Cooling System
HC.OP-AR.GQ-0001, Rev. 3, Intake Structure HVAC Local Panel 1EC581
HC.MD-PM-EA-0002, Rev. 13, Service Water Intake Silt Survey and Silt Removal
HC.CH-SO.EQ-0001, Rev. 18, Service Water Chlorination System Operation
HC.MD-CM.EA-0001, Revs. 20 & 21, Service Water Pump & Motor Removal & Replacement
HC.CH-TI.ZZ-0003, Rev. 23, Environmental Monitoring and Compliance Sampling
ER-AA-340, Rev. 3, GL 89-13 Program Implementing Procedure
NC.ER-AP.ZZ-0039, Rev. 1, Service Water Reliability Program
NC.ER-TI.ZZ-0001, Rev. 1, Inspection of Service Water Heat Exchangers, Piping, Flanges and Miscellaneous Valves
HC.OP-SO.EG-0001, Rev. 35, Safety and Turbine Auxiliaries Cooling Water System Operation

Drawings
—10-1, Service Water, Sh. 1 Rev. 46
—10-1, Service Water, Sh. 2 Rev. 36

Audits and Self-Assessments
QA Assessment Report 2004-0095, System Engineering Performance Monitoring, dated 7/2/04
QA Assessment Report 2004-0167, Flood and Adverse Weather Protection, dated 12/29/04
QA Assessment Report 2005-0059, Preventative Maintenance, dated 6/22/05
QA Assessment Monitoring Feedback 2004-0068, ECCS Materiel Condition and Cleanliness, dated 5/7/04

Calculations
EG-0020, STACS - Required Flows and Heat Loads, Rev. 8
EG 0043, STACS Proto-HX Heat Exchanger Models, Rev. 4
EG 0044, Hope Creek Generating Station - Safety and Turbine Auxiliaries Cooling System (STACS) Proto-HX Heat Exchanger Models, Rev. 1
EG-0046, STACS - Operation, Rev. 5
J-0069, SACS Heat Exchanger Temperature Control Bypass, Rev. 1
J-0061, SACS Heat Exchanger Temperature Control Bypass, Rev. 1
EG-0024, SACS Heat Exchanger Pressure, Rev. 0

Completed Surveillances
1-BC-V038 SSWS to RHR LP B Check Valve - Functional Test (HC.OP-FT.BC-0111), dated 1/16/05
Residual Heat Removal System RHR Heat Exchanger Flow Measurement - 18 Month (HC.OP-ST.BC-0009), dated 10/28/04 and 12/28/04
D Spray Water Pump-DP507 - Inservice Test (HC.OP-IS.EP-0004), dated 01/25/06
C Spray Water Pump-CP507 - Inservice Test (HC.OP-IS.EP-0003), dated 2/7/06
B Spray Water Pump-BP507 - Inservice Test (HC.OP-IS.EP-0002), dated 12/23/05

A Spray Water Pump-AP507 - Inservice Test (HC.OP-IS.EP-0001), dated 1/7/06
Safety Auxiliaries Cooling System - Subsystem B Valves - Inservice Test (HC.OP-IS.EG-0102), dated 12/31/05
Safety Auxiliaries Cooling System - Subsystem A Valves - Inservice Test (HC.OP-IS.EG-0101), dated 2/9/06
D SACS Pump-DP210 - Inservice Test (HC.OP-IS.EG-0004), dated 12/29/05
C SACS Pump-CP210 - Inservice Test (HC.OP-IS.EG-0003), dated 12/15/05
B SACS Pump-BP210 - Inservice Test (HC.OP-IS.EG-0002), dated 1/21/06
A SACS Pump-AP210 - Inservice Test (HC.OP-IS.EG-0001), dated 2/2/06
Service Water Subsystem B Valves - Inservice Test (HC.OP-IS.EA-0102), dated 1/21/06
Service Water Subsystem A Valves - Inservice Test (HC.OP-IS.EA-0101), dated 2/11/06
D Service Water Pump-DP502 - Inservice Test (HC.OP-IS.EA-0004), dated 1/31/06
C Service Water Pump-CP502 - Inservice Test (HC.OP-IS.EA-0003), dated 2/8/06
B Service Water Pump-BP502 - Inservice Test (HC.OP-IS.EA-0002), dated 12/12/05
A Service Water Pump-AP502 - Inservice Test (HC.OP-IS.EA-0001), dated 1/7/06
Residual Heat Removal Subsystem B Valves - Inservice Test (HC.OP-IS.BC-0102), dated 9/29/05
Residual Heat Removal Subsystem A Valves - Inservice Test (HC.OP-IS.BC-0101), dated 1/30/06
BP202, B Residual Heat Removal Pump Inservice Test (HC.OP-IS.BC-0003), dated 12/21/05
AP202, A Residual Heat Removal Pump In-Service Test (HC.OP-IS.BC-0001), dated 2/2/06

Corrective Action Notifications

20178663	20211689	20254401	20268175	20271815	20271880
20178933	20214370	20258266	20270534	20271819	20271897
20189073	20214583	20259434	20271369	20271832	20272153
20189921	20239304	20265615	20271759	20271834	20272419
20198535	20246549	20265702	20271798	20271840	20273368
20211615	20249352	20266855	20271809	20271852	

Evaluations

70040640	70042477	70048128	70049506	70053956	80082993
70042421	70042912	70048397	70049853	70054180	

Work Orders

30058933	30097052	30103145	30112253	60049772	60050378
30096343	30101865	30105294	30118311	60050088	

Miscellaneous
Heat Exchanger Performance Monitoring Guidelines, EPRI NP-7552M Project 3052-1 Final Report, December 1991
Risk-Informed Inspection Notebook for Hope Creek Generating Station, Revision 2
Hope Creek Generating Station - NRC Inspection Report No. 50-354/04-02
Heat Exchanger - Residual Heat Removal (RHR), Rev. 2
Heat Exchanger - Residual Heat Removal (RHR), Rev. 3
Hope Creek Operability Determination (CROD)/Follow-up Assessment (CRFA) Log, dated 2/13/2006

Operations Department Night Orders (HC-2006-010), dated 2/14/06
Work Clearance Documents 4029239, 4176187 and 5144254
River Conditions Update Report, dated 2/10/06
Fall 2005 Bathymetric Survey for Hope Creek Service Water Intake Structure (H-6105-01), dated 11/05
Hope Creek Generating Station, Issuance of Amendment, Ultimate Heat Sink Temperature Limits (TAC No. MA2060), dated 4/19/99
Safety Evaluation by the Office of Nuclear Reactor Regulation Related to Amendment No. 94 to Facility Operating License No. NPF-57, dated 2/26/96

Operating Experience
PSEG Response to NRC Information Notice 96-60: Potential Common-Mode Post-Accident Failure of Residual Heat Removal Heat Exchangers
PSEG Response to NRC Information Notice 98-25: Loss of Inventory from Safety-related, Closed-loop Cooling Water Systems
PSEG Response to Generic Letter 89-13, Service Water Problems Affecting Safety Related Equipment, Salem and Hope Creek Generating Stations, dated January 26, 1990
PSEG Update on the Implementation of Commitments Made in Response to Generic Letter 89-13, dated August 1, 1997
PSEG Update on the Implementation of Commitments Made in Response to Generic Letter 89-13, dated May 10, 1999
Generic Service Water System Risk-Based Inspection Guide, NUREG/CR-5865 EGG-2674
Operating Experience Feedback Report - Service Water System Failures and Degradations, NUREG-1275 Vol. 3

Preventive Maintenance
A SACS Lower Heat Exchanger (1A1E-201) Eddy Current Inspection, dated 11/11/04
Hope Creek RF12 As Found Condition in the SACS A-1 HX North Side Pictures dated 10/30/04
Service Water System Heat Exchanger Inspection Report, dated 10/30/04
1A1E-201 SACS HX Performance Data Trending, dated 4/6/03 - 12/4/05
Hope Creek Service Water Bays Silt Level Performance Monitoring Book, updated 11/14/05

System Health Reports and Trending Data
Service Water Quarterly Ship System Report, 4th Qtr 2005
System Health Overview Report (RHR), dated 1/19/2006
Plant Health Committee System Presentation (RHR), 4th Qtr 2005
Plant Health Committee System Presentation (SACS), 4th Qtr 2005
Plant Health Committee System Presentation (SW), 4th Qtr 2005
System Health Overview Report (SACS), dated1/20/2006
Generic Letter 89-13 Program Health Report, 4th Qtr 2005

Section 1R11: Licensed Operator Requalification Program

Procedures
HC.OP-EO.ZZ-0101(Q), Reactor/Pressure Vessel (RPV) Control, Rev. 10
HC.OP-EO-ZZ-0102(Q), Primary Containment Control, Rev. 11
HC.OP-AB.BOP-0006(Q), Main Condenser Vacuum, Rev. 8

HC.OP-AB.RPV-0003(Q), Recirculation System/Power Oscillations, Rev. 10
HC.OP-AB.RPV-0001(Q), Reactor Power, Rev. 6
HC.OP-AB.RPV-0004(Q), Reactor Level Control, Rev. 1
HC.OP-AB.COOL-0001(Q), Station Service Water, Rev. 7

Corrective Action Notifications
20265700

Other Documents
Simulator Scenario Guide - Grassing/Primary Condensate Pump Trip/Loss of Vacuum
4th Quarter 2005 Operations Department Roll-Up Meeting Minutes

Section 1R12: Maintenance Implementation

Procedures
HC.MD-CM.EA-0001(Q), Rev. 22, Service Water Pump and Motor Removal and Replacement
HC.MD-CM.EA-0003(Q), Rev. 27, Service Water Strainer Overhaul & Repair
HC.ER-DG.ZZ-0002(Z), Rev. 0, System Functional Maintenance Rule Scoping vs. Risk Reference
HC.ER-DG.ZZ-0002(Z), Rev. 1, System Function Level Maintenance Rule Scoping vs. Risk Reference
HC.OP-IS.BC-0001(Q), Rev. 33, AP202, 'A' Residual Heat Removal Pump In-Service Test
HC.MD-PM.ZZ-0006(Q), Rev. 13, General Preventive Maintenance for Distribution Panels, MCC's, Unit Substations, and Switchgear
HC.MD-PM.PB-0001(Q), Rev. 22, 4.16kV Breaker Cleaning and P.M.
HC.OP-SO.PB-0001(Q), Rev. 21, 4.16kV System Operation
NC.NA-AP.ZZ-0016(Q), Rev. 6, Monitoring the Effectiveness of Maintenance
NC.QA-AP.ZZ-0077(Z), Rev. 1, Self Assessment Process
NC.CA-TM.ZZ-0001(Z), Rev. 1, Nonconforming Material/Component Evaluation Template
NC.NE-DG.ZZ-0004(Z), Rev. 0, Maintenance Repair Instruction Development
NC.WM-AP.ZZ-0000(Q), Rev. 13, Notification Process
NC.CC-AP.ZZ-0080(Q), Rev. 18, Engineering Change Process
NC.CA-TM.ZZ-0005(Z), Rev. 6, Apparent Cause Evaluation Guideline
SH.ER-DG.ZZ-0002(Z), Rev. 1, Maintenance Rule (a)(1) Evaluations and Goal Monitoring
SH.ER-DG.ZZ-0001(Z), Rev. 3, Preventable and Repeat Preventable System Functional Failure Determination
SH.ER-DG.ZZ-0003(Z), Rev. 0, Processing Maintenance Rule Reliability Data
SH.SE-DG.ZZ-0009(Z), Rev. 1, System Specific Performance Criteria
SH.MD-PM.ZZ-0029(Q), Rev. 2, Relay Testing

Drawings
PM076Q-0009(1), Service Water Strainer Final Assembly
83858, Backwash Arm Shaft For 28-596

Corrective Action Notifications

20267705	20242252	20239767	20255971	20260251	20260748
20242883	20242258	20254749	20260075	20260268	20262758

20255075	20273721	20253767	20169291	20140358	20074693
20264237	20273739	20208058	20160842	20130501	20069140
20273737	20275734	20199196	20147277	20130227	20067616
20256144	20275491	20173406	20146532	20128503	20052664
20260743	20274055	20173279	20145569	20125449	20047911
20273724	20268682				

Evaluations

70034178	70045584	70049209	70044957	70013605	70033834
70049196	70041921	70050850	70040983	70017330	70035381
70036265	70045638	70044133	70033442	70017766	70036163
70036459	70049655	70047975	70035268	70029361	70040686
70045113	70051219	70051635	70042439	70029372	70050655
70043785	70036674	70052345	70051459	70031646	70053036
70038854	70046881	70050433	70012587	70031904	70055182
70040229	70042832	70041101			

Work Orders

60059474	60058794	60014842	60021698	60037050	60061481
60038390	60061176	60019424	60033687	60048848	60053128
60039109	60059492	60019900	60036408	60064269	60056017
60058580					

30124555	30123929	30127136

Administrative Documents

Report #80079783, 2005 10 CFR 50.65 (a)(3) Maintenance Rule Periodic Assessment - Salem and Hope Creek Generating Stations, June 2005
ER-SH-2002, Rev. 0, System Health Indicator Program
SH.SE-DG.ZZ-0004, Rev. 1, Expert Panel, November 2003
SH.SE-DG.ZZ-0007, Rev. 3, Preventable and Repeat Preventable System Functional Failure Determination
SH.SE-DG.ZZ-0009, Rev. 1, System Specific Performance Criteria, February 2005
SH.SE-DG.ZZ-0009, Rev. 0, System Specific Performance Criteria, June 1999
SH.SE-DG.ZZ-0010, Rev. 1, Periodic Maintenance Effectiveness Assessment, June 2002

Hope Creek Expert Panel Meeting Minutes

HCEP 04-003, May 26, 2004
HCEP 05-004, April 6, 2005
HCEP 05-005, April 28, 2005
HCEP 04-005, January 3, 2006

Other Documents

NRC Regulatory Guide 1.160, Monitoring the Effectiveness of Maintenance at Nuclear Power Plants, Revision 2
NUMARC 93-01, Industry Guideline For Monitoring the Effectiveness of Maintenance at Nuclear Power Plants, Revision 2

Nuclear Energy Institute (NEI) 99-02, Rev. 2, "Regulatory Assessment Performance Indicator Guideline"
Hope Creek Maintenance Rule “At Risk” Systems
Hope Creek Maintenance Rule Status and Projections, January 12, 2005
PSEG Nuclear: Hope Creek Station OE.2: Number of (a)(1) Systems
PSEG Nuclear: Hope Creek Station OM.2: Equipment Failures
Main Steam System Health Report, 2nd Quarter 2005
Main Steam System Quarterly Ship Report, 3rd Quarter 2005
HPCI Quarterly Ship Report, 3rd Quarter 2005
HPCI System Health Report, 2nd Quarter 2005
HPCI Plant Committee System Presentation, 3rd Quarter 2005
Area Radiation Monitoring Quarterly Ship Report, 3rd Quarter 2005
Radiation Monitoring System Health Report, 2nd Quarter 2005
Area Radiation Monitoring Quarterly Ship Report, 4th Quarter 2005
Residual Heat Removal System Health Report, 4th Quarter 2005
Residual Heat Removal Quarterly Ship Report, 4th Quarter 2005
Control Room Chilled Water System Health Report, 4th Quarter 2005
Control Room Chilled Water Quarterly Ship Report, 4th Quarter 2005
Area Radiation Monitoring Plant Health Committee System Presentation, 4th Quarter 2005
Process Radiation System Plant Health Committee System Presentation, 4th Quarter 2005
Plant Leak Detection System Plant Health Committee System Presentation, 3rd Quarter 2005
Service Water System Quarterly Ship Report, 3rd Quarter 2005
Service Water System Health Report, 2nd Quarter 2005
Service Water Plant Health Committee System Presentation, 3rd Quarter 2005
UFSAR Section 9.2.1
Service Water Technical Specifications 3/4.7.1.2
Hope Creek Control Room Narrative Logs, 11/4/2005, Shift 6:00AM-18:00
Hope Creek Control Room Narrative Logs, 11/4/2005, Shift 18:00-6:00AM
Hope Creek Control Room Narrative Logs, 11/6/2005, Shift 6:00AM-18:00
Hope Creek Maintenance Rule Service Water Pump A-D Unavailability Hours 12/31/02 - 11/30/05)
Vendor Technical Document PM076(Q)-0028(001), “Service Water Strainer, Self-Cleaning Strainer - Installation, Operation, Maintenance, and Parts List”
PSEG Maintenance Rule Intranet Data for the Residual Heat Removal System
PSEG System Health Indicator Program (eSHIP) Intranet Data for the Residual Heat Removal System
Hope Creek Generating Station (HCGS) Updated Final Safety Analysis Report, Section 7.4.1.2, “Standby Liquid Control System”
HCGS Updated Final Safety Analysis Report, Section 9.4, “Air Conditioning, Heating, Cooling, and Ventilation Systems”
HCGS Technical Specification 3/4.7.6, “Control Room Emergency Air Conditioning System”

Section 1R13: Maintenance Risk Assessments and Emergent Work Control

Procedures
HC.OP-AB.HVAC-0001(Q), Rev. 3, HVAC
HC.OP-IS.EG-0002(Q), Rev. 31, B SACS Pump - BP210 - Inservice Test

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M-11-1, Safety Auxiliaries Cooling Reactor Building, Sheet 1, Rev. 29
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Corrective Action Notifications

20267600	20268980	20198613	20271692	20225555	20269209
20268626	20270448	20204374	20252560	20245071	20272559
20268836	20188123				

Evaluations

70053360	70053134	70050468	70053956	70049089	70054833

Work Orders

60060463	60060868	60060797	60054135

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HCGS PSA Risk Evaluation Forms for Work Week Nos. 105 to 117
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Procedures
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HC.OP-AB.RPV-0003(Q), Rev 10, Recirculation System/Power Oscillations
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Corrective Action Notifications

20267957	20268002	20270668	20270415	20268229	20270414
20256157					

Evaluations

80087951	70053715

Section 1R15: Operability Evaluations

Procedures
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M-08-1(Q), Service Water, Sheet 1, Rev. 18
M-86-1(Q), Drywell Control Diagram, Sheet 1, Rev. 7

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20172444	20268979	20274055	20271798	20223712	20268512
20187329	20267600	20274095	20274800	20274095	20252560
20213038	20268512	20274560	20264785	20274055	20271650
20213326	20272559	20275788	20273222	20272559	20271692
20268983					

Evaluations

70036161	70043038	70053092	70053797	80057204	70053956
70038854	80088863	70054833			

Work Orders

60050034	60060347	60061269	50092769	60061269	60057345
60060811	60061269	60061676	60055081	60060989	

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Section 1R17: Permanent Plant Modifications

Procedures
HC.OP-SO.EE-0001(Q), Torus Water Cleanup System Operation, Rev. 9
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M-08-0(Q), Sheet 1, Condensate & Refueling Water Storage & Transfer, Rev. 29
M-08-0(Q), Sheet 2, Condensate & Refueling Water Storage & Transfer, Rev. 19
M-51-1(Q), Sheet 1, Residual Heat Removal, Rev. 36
M-51-1(Q), Sheet 2, Residual Heat Removal, Rev. 34
M-54-0(Q), Sheet 1, Fuel Pool Filter Demineralizer, Rev. 21
M-53-1(Q), Sheet 1, Fuel Pool Cooling & Torus Water Cleanup, Rev. 28
M-53-1(Q), Sheet 2, Fuel Pool Cooling & Torus Water Cleanup, Rev. 25

Corrective Action Notifications

20249279	20259785	20265946	20247527	20265096	20112302
20238133	20261157	20269804	20271798		20262684

Evaluations

70048439	70053532	70033553

Work Orders
80057204

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EG-0046, STACS Operation, Rev 5
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Procedures
NC.MD-AP.ZZ-0050(Q), Maintenance Testing Program Matrix, Rev. 4
HC.OP-IS.BJ-0101(Q), High Pressure Coolant Injection System Valves - Inservice Test, dated 1/3/06
HC.MD-ST.KJ-0001(Q), Diesel Generator Technical Specification Surveillance And Preventive Maintenance, Rev. 35
HC.OP-ST.KJ-0003(Q), Emergency Diesel Generator 1CG400 Operability Test - Monthly, Rev. 57
NC.DM-AP.ZZ-0002(Q), Procedure On The Spot Change (OTSC) Process, Rev. 2
NC.DM-AP.ZZ-0005(Q), Generic Implementing Procedure Use And Adherence Standards, Rev. 1
NC.NA-AP.ZZ-0001(Q), Nuclear Procedure Program, Rev. 17
HC.OP-SO.GJ-0001(Q), Control Area Chilled Water System Operation, Rev. 42
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HC.OP-IS.EG-0001(Q), A SACS Pump - AP210 - Inservice Test, Rev. 27
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HC.IC-DC.EG-0006(Q), SACS to TACS Loop A Low Flow Channel FT-2544D, Rev. 4
HC.OP-SO.KL-0001(Q), Primary Containment Instrument Gas System Operation, Rev. 19
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M-88-1(Q), Sheet 1, Aux. Bldg. - Diesel Area Control Diagram, Rev. 15
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M-89-1(Q), Sheet 2, Aux. Bldg. - Control Area Control Diagram, Rev. 01
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20000430	20267501	20267675	20267832	20269547	20230908
20050732	20267506	20267676	20267842	20269554	20249742
20068895	20267531	20267690	20267865	20269594	20271443
20244454	20267556	20267732	20269209	20269744	20271769
20259041	20268271	20267776	20249792	20270391	20268693
20264811	20267594	20267779	20225555	20268035	20271461
20267105	20267595	20267800	20254263	20266815	20268693
20267277	20267651	20267813	20269539	20229849	

Evaluations

70048995	70042906	70050040	80020271	70027972	70030136
70050651		70045999			

Work Orders

30047121	30129512	50091404	60060628	60060754	60061023
30081178	30118317	60017440	60058227	60053595	40000733
30110360	50077541	60060348	60054135	60057519	40015180
30071701	50077555	60038972	60060628		

Other Documents

NRC Information Notice No. 91-62, Diesel Engine Damage Caused by Hydraulic Lockup Resulting from Fluid Leakage into Cylinders
PSEG Response to NRC Information Notice No. 91-62
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HCGS NCO Narrative Logs
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HCGS Plan Of The Day (POD) Work Management Schedule for Work Weeks 105 through 117
HCGS Probabilistic Risk Assessment (PRA) Risk Evaluation Form for Work Weeks 105 through 117
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Quick Human Performance Investigation Report: IRM B surveillance test results in unexpected B1 1/2 scram, dated January 19, 2006.

Section 1R22: Surveillance Testing

Procedures
HC.OP-IS.BC-0001(Q), AP202, 'A' Residual Heat Removal Pump In-Service Test, Rev. 33
HC.OP-DL.ZZ-0026(Q), Surveillance Log, Rev. 101
HC.OP-GP.ZZ-0005(Q), Drywell Leakage Source Detection, Rev. 5
HC.RA-AP.ZZ-0051(Q), Leakage Reduction Program, Rev. 4
HC.OP-IS.BE-0002(Q), B & D Core Spray Pumps - BP206 and DP206 - Inservice Test, Rev. 39
HC.IC-FT.BE-0004(Q), Functional Test Core Spray - Division 2 Channel E21-N651B Discharge Line Flow (Minimum Flow Bypass), Rev. 7
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Drawings
M-51-1(Q), Sheet 2, Rev. 34
M-25-1(Q), Sheet 1, Plant Leak Detection, Rev. 17
M-25-1(Q), Sheet 2, Plant Leak Detection, Rev. 7
M-25-1(Q), Sheet 3, Plant Leak Detection, Rev. 9
M-55-1(Q), Sheet 1, High Pressure Coolant Injection, Rev. 38
M-55-1-SIMP(Q), Sheet 1, High Pressure Coolant Injection, Rev. 0

Corrective Action Notifications
20270534 20257979 20268800 20211740 20257979
20265615

Evaluations
70051282 70042912 70051282

Work Orders
50091338 50092181 50093950 50093956 50089225
50091901

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ASME Standard OMa-1988, Part 6
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In-Service Testing program trending data for 'A' LPCI pump flow, differential pressure, and required vibration points

PSEG Chemistry Department Unidentified Drywell In-Leakage Updates
Plant Process Computer Trend Data

Section 4OA2: Identification and Resolution of Problems

Procedures
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SH.ER-DG.ZZ-0001(Z), Preventable and Repeat Preventable System Functional Failure Determination, Rev. 3
NC.NE-DG.ZZ-0004(Z), Maintenance Repair Instruction Development, Rev. 0
NC.CC-AP.ZZ-0043(Q), Vendor Information Program, Rev. 2
NC.CA-TM.ZZ-0005(Z), Apparent Cause Evaluation Guideline, Revs. 3, 6
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Drawings
M-90-1, Sheet 1, Auxiliary Building Control Area Chilled Water System - Control Area Chillers, Rev. 19

Corrective Action Notifications

20254283	20254263	20238229	20264293	20271285	20260948
20264705	20262694	20238316	20190574	20246457	20241631

Evaluations

70051863	70052209	70050651	70047411	70039481	70048310
70050657					

Work Orders

60056420	60057946	60057725

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VTD PM723Q, Carrier Centrifugal Chiller Compressor Vendor Manual

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Section 4OA3: Event Followup

Procedures
HC.OP-AB.RPV-0001(Q), Reactor Power, Rev. 6
HC.OP-AB.RPV-0004(Q), Reactor Level Control, Rev.1
HC.OP-AB.RPV-0003(Q), Recirculation System/Reactor Power Oscillations, Rev. 10
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NC.NE-DG.ZZ-0004(Z), Maintenance Repair Instruction Development, Rev. 0
NC.CC-AP.ZZ-0043(Q), Vendor Information Program, Rev. 2
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HC.MD-GP.ZZ-0245(Q), Hope Creek Carrier Centrifugal Chiller Frequent & Periodic Inspections (Overhaul), Revs. 0, 1
SH.MD-GP.ZZ-0022(Q), Bolt Torquing and Bolting Sequence Guidelines

Drawings
M-90-1, Sheet 1, Auxiliary Building Control Area Chilled Water System - Control Area Chillers, Rev. 19

Corrective Action Notifications

20267833	20267984	20238229	20238316	20264293	20190574
20267985	20270751				

Evaluations

70053149	70052891	70053837	70047411	70039481	70048310

Other Documents
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Reactivity Plan to Establish Initial Conditions for STT and Deep/Shallow
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Plant historian trend plots of thermal power, core flow, xenon concentration, APRM output, reactor water level, reactor recirculation pump power, reactor feed pump flow for 2/4/2006, 3:00-05:00 a.m.
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LER 05000354/2005-004-00, A Control Room Emergency Filtration (CREF) Train Inoperable with B CREF Out Of Service
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EPRI TR-104213s, Bolted Joint Maintenance & Applications Guide, December, 1995
DE-CB.GK(GJ)-0051(Q), Configuration Baseline Document for Auxiliary Building Control Area HVAC and Chilled Water Systems, Rev. 0

LIST OF ACRONYMS

ATWS	Anticipated Transient Without Scram
CFR	Code of Federal Regulations
CREF	Control Room Emergency Filtration
EDG	Emergency Diesel Generator
FOST	Fuel Oil Storage Tank
GPM	Gallons Per Minute
HCGS	Hope Creek Generating Station
HPCI	High Pressure Coolant Injection
HX	Heat Exchanger
IST	In-Service Test
M&TE	Measuring and Test Equipment
MR	Maintenance Rule
NCV	Noncited Violation
NRC	Nuclear Regulatory Commission
NRR	Nuclear Reactor Regulation
PCP	Primary Condensate Pump
PIs	Performance Indicators
PSEG	Public Service Electric Gas Nuclear, LLC
QA	Quality Assessment
RCIC	Reactor Core Isolation Cooling
RHR	Residual Heat Removal
SACS	Safety Auxiliaries Cooling System
SCWE	Safety Conscious Work Enviroment
SDP	Significance Determination Process
SLC	Standby Liquid Control
SPC	Suppression Pool Cooling
SRV	Safety Relief Valve
ST	Surveillance Test
STACS	Safety and Turbine Auxiliaries Cooling System
STD	Standard Deviation
SW	Service Water
SWC	Stator Water Cooling
TS	Technical Specification
UFSAR	Updated Final Safety Analysis Report
URI	Unresolved Item